We claim:

1. A method for depositing onto a support one or more catalytic components, said method comprising:

providing one or more vaporizable catalytic components;

converting said one or more vaporizable catalytic components into a vapor; and

depositing said vapor onto said support in an amount sufficient to produce a concentration of said one or more catalytic components adapted to produce a catalytically effective coating consisting essentially of said one or more catalytic components on said support.

2. The method of claim 1 wherein at least said depositing occurs in a vacuum.

3. The method of claim 1 or 2 wherein said support is a carbon catalyst support.

4. The method of claim 3 wherein said carbon catalyst support comprises a material selected from the group consisting of graphite, a carbon filament bundle,

reticulated carbon, carbon cloth, and carbon mesh.

5. The method of any of claims 1-4 wherein said support comprises a membrane comprising a composite of polytetrafluoroethylene comprising impregnated ion exchange media, said composite comprising a thickness of about 1 μm.

6. The method of any of claims 1-5 wherein said one or more catalytic components comprises one or more noble metals.

7. The method of any of claims 1-6 wherein said one or more catalytic components comprises one or more metals selected from the group consisting of platinum, gold, silver, palladium, ruthenium, rhodium, iridium.

8. The method of any of claims 1-7 wherein said concentration comprises less than about 0.3 mg/cm^2.

9. The method of any of claims 1-7 wherein said concentration comprises less than about 0.2 mg/cm^2.

10. The method of any of claims 1-7 wherein said concentration comprises from about 0.01 to about 0.2 mg/cm^2.

11. The method of any of claims 1-10 wherein said one or more catalytic components comprise platinum.

12. The method of any of claims 1-11 wherein said support is a coating on a carbon cloth, wherein said coating is selected from the group consisting of carbon, a wet proofing material, and a combination thereof.

13. The method of claim 12 wherein said wet proofing material is polytetrafluoroethylene.

14. The method of any of claims 1-13 further comprising

providing a solid polymer electrolyte membrane; and

disposing said support in ionic communication with said solid polymer electrolyte membrane.

15. The method of any of claims 1-14 wherein said solid polymer electrolyte membrane has a first side and a second side opposite said first side, and said method further comprises disposing said support on each of said first side and said second side to produce a membrane electrode assembly.

16. The method of any of claims 1-15 wherein said converting is thermally converting.

17. The method of any of claims 1-5 wherein said one or more catalytic components are metallic.

18. An electrode produced by a process comprising:

providing one or more vaporizable catalytic components;

converting said one or more vaporizable catalytic components into a vapor; and

depositing said vapor onto a support in an amount sufficient to produce a

concentration of said one or more catalytic components adapted to produce a catalytically effective coating consisting essentially of said one or more catalytic components on said support.

19. The electrode of claim 18 wherein said support is a carbon catalyst support comprising a material selected from the group consisting of graphite, a carbon filament bundle, reticulated carbon, carbon cloth, and carbon mesh.

20. The electrode of claim 19 wherein said carbon catalyst support comprises a material selected from the group consisting of a carbon cloth and a coating on a carbon cloth selected from the group consisting of carbon, a wet proofing material, and a combination thereof.

21. The electrode of claims 18-20 wherein said support comprises a membrane comprising a composite of polytetrafluoroethylene comprising impregnated ion exchange media, said composite comprising a thickness of about 1 μm.

22. The electrode of any of claims 18-21 wherein said one or more vaporizable catalytic components comprises one or more noble metals.

23. The electrode of claim 22 wherein said one or more vaporizable catalytic components comprises one or more metals selected from the group consisting of platinum, gold, silver, palladium, ruthenium, rhodium, iridium.

24. The electrode of any of claims 18-23 wherein said one or more vaporizable catalytic components comprises platinum.

25. The electrode of any of claims 18-24 wherein said support comprises a coating on a carbon cloth wherein said coating is selected from the group consisting of carbon, a wet proofing material, and a combination thereof.

26. The electrode of claim 25 wherein said wet proofing material is polytetra-fluoroethylene.

27. The method of any of claims 18-26 wherein said converting is thermally converting.

28. The method of any of claims 18-21, 25, and 26 wherein said one or more catalytic components are metallic.

29. An electrode comprising a support having disposed thereon a vapor deposited electrocatalytic coating consisting essentially of one or more electrocatalysts, wherein said one or more electrocatalysts are present in an amount of about 0.3 mg/cm^2 or less.

30. The electrode of claim 29 wherein said vapor deposited electrocatalytic coating is deposited in a vacuum by electron-beam physical vapor deposition.

31. The electrode of claims 29 and 30 wherein, at a cell potential of about 0.6 V, an MEA containing said electrode half cell operating as a cathode yields about 800 mA cm^{-2} or greater.

32. The electrode of claims 29-31 wherein said electrode comprises an electrocatalytic active area of about 300 cm^2 or greater.

33. The electrode of claims 29-32 wherein said one or more catalytic components comprises platinum.

34. The electrode of claims 29-33 wherein said support comprises a membrane comprising a composite of polytetrafluoroethylene comprising impregnated ion exchange media, said composite comprising a thickness of about 1 μm.

35. The electrode of claims 29-34 wherein said converting is thermally converting.

36. An electrode comprising a support comprising a deposit disposed thereon, said deposit comprising a catalytically effective load of an electrocatalyst comprising an electrocatalytic active area at least in part comprising rod-shaped structures.

37. The electrode of claim 36 wherein said rod-like structures are visible at a magnification of at least about x10k.

38. The electrode of claims 36 and 37 wherein said deposit further comprises particles of said electrocatalyst comprising an outer surface, wherein said electrocatalytic active area comprises a majority of said outer surface of said particles.

39. The electrode of claims 36-38 wherein said support has a surface area, and said deposit covers about 300 cm^2 or more of said surface area.

40. The electrode of claims 36-39 wherein said catalyst comprises platinum.

41. The electrode of claims 36-40 wherein, at a cell potential of about 0.6 V, an MEA containing said electrode as a half cell operating as a cathode yields a power output of about 400 mA cm^{-2} or greater.

42. The electrode of claims 36-40 wherein, at a cell potential of about 0.6 V, an MEA containing said electrode as a half cell operating as a cathode yields a power output of about 800 mA cm^{-2} or greater.

43. The electrode of claims 36-40 wherein, at a cell potential of about 0.6

V, an MEA containing said electrode as a half cell operating as a cathode yields a power output of about 1000 mA cm^{-2} or greater.

44. The electrode of claims 36-43 wherein said support comprises a membrane comprising a composite of polytetrafluoroethylene comprising impregnated ion exchange media, said composite comprising a thickness of about 1 μm.

45. A membrane electrode assembly comprising the support of any of claims 18-44.

46. The electrode of any of claims 18-44 wherein

said support has a surface area; and,

substantially all of said surface area ionically communicates with an ionomeric membrane.

47. The electrode of claim 46 wherein said surface area is 300 cm^2 or greater.